Surge Protection: Separating Myth From Fact

You've Got More Electronics Than The Entire Neighborhood—Here's How To Protect It

by Harold Ort, N2RLL, Editor

Take a couple of minutes and look at all your radios, switching power supplies, computers, and home entertainment equipment. Chances are you've got a lot more invested in electronics than you may realize. I know you'd miss all those radios if they suddenly got fried—even more so if their loss *could have* been prevented. Fact is, unlike what many folks believe, surges or spikes are the norm, not the rarity. But you can protect your investment.

The Basics: How And Why Surges Happen

A surge, also known as a "spike" is a very short-duration—lasting only a fraction of a second—fluctuation in voltage that can reach thousands of volts (and amps or current!). Some causes of surges include large appliances or nearby heavy equipment switching on and off, power sub station and transformer problems, and, by far the major cause of surges, lightning strikes.

Today most electronic devices and household appliances are microprocessor controlled, making them very sensitive to surges. We'll only cover surges entering your equipment through the electrical mains, *not* direct lightning strikes, which, while devastating and usually life-threatening, is a topic we'll explore in a future issue, including proper shack grounding techniques and protection.

Surge Protection

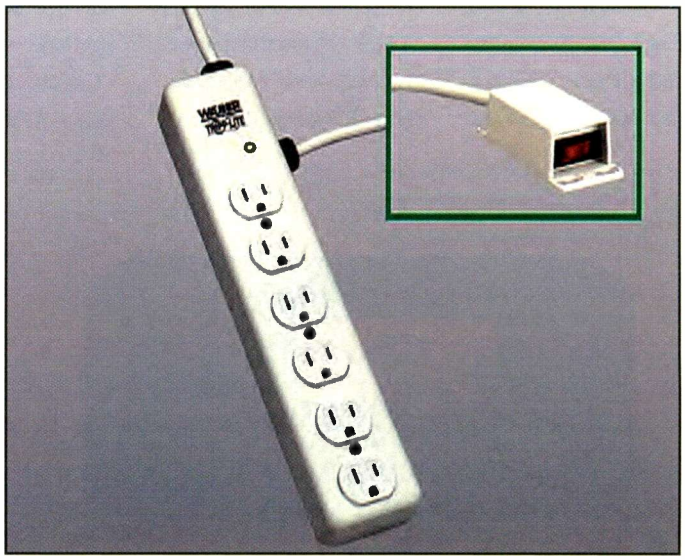
Surge protection devices, or suppressors, use one of three basic methods to clamp the spike:

- gas discharge tube
- metal oxide varistor (MOV)
- solid-state semiconductor

Underwriter's Laboratories calls surge suppressors "transient voltage surge suppressors" and they also test manufacturer's suppressors, so make sure you see either the UL or other safety testing label on the box or suppressor itself. (One company we looked at, ZeroSurge actually went a step *beyond* the *standard* "UL 1449" certification to receive the UL 1449 Adjunct certification).

Most of the power strips you'll find at the hardware, electronics, or office supply store use MOVs, which frankly offer little protection and can be instantly fried, leaving your equipment vulnerable. Your best bet is to find a surge suppressor that offers both thermal and surge protection in one strip or box; one with a silicon avalanche diode is best and does a good job of clamping the surge voltage.

Here's Tripp Lite's Isobar4Ultra that includes "multiple layers of metal oxide varistors," a 2200-joule rating, all metal housing, and status LEDs. It sells for $89.95



The Tripp Lite DG115-SR Waber-by-Tripp Lite Surge Suppressor has six power receptacles, a 600-joule rating, metal housing, and a 15-amp resettable circuit breaker. It costs $64.48.

This Brickwall 2R15 suppressor is a steel cabinet, two-outlet, series surge reactor current limiter device with 172-volt (nominal) clamping rating. It costs about $170 from Brickwall at brickwall.com. Their website says, "Surge Protectors That Will Not Fail."

Residential customers who require industrial-grade protection are well-guarded from surges, transients, and lightning with MCG's Model 40, a low-profile suppressor offering whole-house shielding. The Model retails for $360.

The fact is that surge suppressors don't *suppress* the spike or surge, they protect your equipment by *diverting the spike to ground*. MOV surge suppressors are a lot like electrical pressure valves; too much pressure and the extra surge is diverted to ground at your electrical outlet.

More expensive and longer lasting suppression technology uses inductors that essentially soak up surges and then slowly release the energy. But as you might expect, most folks buy the less expensive MOV technology-based suppressors

Pay Now, Or Pay Later—Your Choice

The old expression is a *perfect* advertising phrase for surge protection manufacturers. Not having surge protection on your appliances and equipment is like not checking the backyard for small, but dangerous lawn tools or kid's toys before you mow; sooner or later you'll wish you had taken five minutes to do the smart—and *safe*—thing!

What *can* you do? The short answer, plenty. But, like anything else, don't just go through the motions with some half-baked protection thinking you've done your best.

One of the more expensive and perhaps better surge protection routes is to have whole-house protection. MCG Surge Protection, founded in 1967 and specializing solely in the design and manufacture of AC power line, data/signal/telephone line, and DC surge protectors, offers such coverage.

"The investment the so-called 'hobbyist' makes in sensitive equipment can be quite sizeable," says Christine Jelley, CEO of MCG. "We advise installing MCG Model 40 AC Power Line Protector directly at the service panel to provide 40,000A of rugged protection. The units are fully monitored and meet or exceed ANSI IEEE C62.41-1992and UL 1449, 2nd Ed. specifications."

Another approach you can take is to contact your electric utility about having a meter-based surge protection box installed at your home where your electric service enters the building. The service could include several smaller plug-in suppression devices for your use as well. Typically the cost is from $6 to $10 a month with a one- or two-year contract, plus a $30 to $60 one-time installation fee. Simple math then, for a five-year

Specifications And Terms You Need To Know

Enter the often-confusing world of specs and jargon, but it really *isn't* as complicated as the engineering world and manufacturers would have you believe. Here's a selection of some of the more popular surge suppression specs to help you make an intelligent buying decision.

Clamping Voltage: This is the voltage-limiting capability of the device. It's the voltage that will be allowed to pass on to your equipment after a surge is clamped or diverted. A number you'll find quite frequently is 330 volts. It's part of the UL standards, but just remember, the lower the better.

Response Speed, or Speed of Response: In the real world, not a very valuable figure, but you'll see it on some packages. Surge suppressor technology is, for the most part, the same and the need for faster response times is, in reality, unnecessary.

Joules: The higher the value, the more the device can handle without damaging itself. Values range from 100 to 1000 joules. Trouble is the figure is sometimes based on wiring combinations in the protection device, so are you seeing *total* joules or a combination of the wiring? A rating of 600 or higher is fine, but buyer beware: Sometimes manufacturers using MOVs will use multiple MOVs in their unit, giving a high joule rating. Consumers, seeing the higher number think they're getting additional protection. If one of those MOVs goes, you're in trouble, and so much for the manufacturer's claim. You're better off checking out the "maximum surge current" rating for a protector.

Maximum Surge Current: This figure can be several hundred to several thousand amps. Simply put, it's a measure of the protector's ability to handle surges without damaging itself. Lower values are fine, but if a higher value gives you a little more mental comfort, go for it.

Three-Line Protection: Hot, neutral, and ground lines are all protected against surges.

Internal Protection: What happens to the output (load) side of the protector (does it cut off power or are you still protected?) in the event of a surge if the internal elements are damaged. Is there a cut-off and reset feature on the suppressor? You probably want a surge suppressor that incorporates some sort of circuit breaker or fuse, just in case.

Guaranteed Protection: Life, death, and taxes are guaranteed, so be sure to read the fine print. This is a simple measure of the company's confidence in its suppressor.

ZeroSurge's 6000-volt, 3000-amp generator getting ready to—literally fire up a consumer-grade suppressor.

Ionel Stefan at ZeroSurge assembles 2R8 surge suppressors for field testing.

period, for example, could cost $100 a year for a total of about $500. You do your own math when it comes to replacing most of your electronics and appliances in the event of a major strike and surge. It's important to remember that this sort of protection is adequate if your appliances and equipment are "one-link," meaning they're just connected to the electrical circuitry of your apartment or home. If they're "two-link" appliances (such as a computer, TV, VCR, etc.), they're also connected to an outside antenna, cable, or telephone line.

Yet another protection method is to purchase—through your electrician—circuit breaker snap-in surge protectors. You'll probably find that you'll need to replace your existing panel/box because these snap-in protectors typically only fit in a box from the same manufacturer.

Your easiest solution is to check out the variety of brands of surge protectors—either small single-unit plug-ins or others that allow you to plug in from one to as many as six or eight appliances. You'll find that some even come with telephone/modem or cable protection. This is an important feature to look for because your equipment isn't protected from surges if it's also connected to the phone line and your protector doesn't include the "in/out" phone receptacles (or even cable connectors for your cable TV). Many units include a fuse of sorts that completely shuts down output power to your equipment. Make an intelligent decision based on your individual needs, not what a salesperson wants to sell.

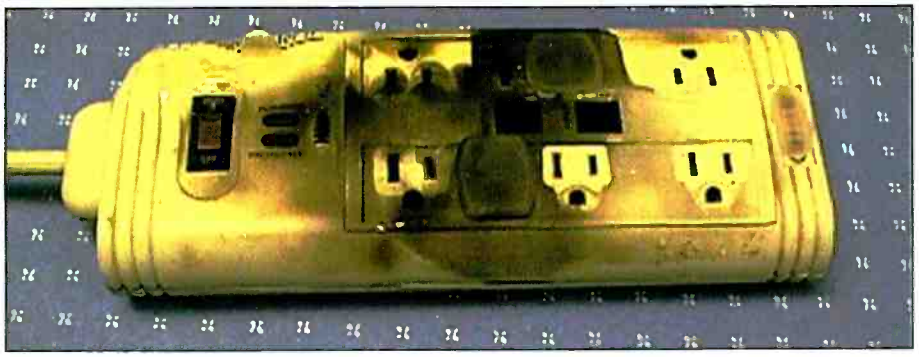
Be sure you read the manufacturer's instructions for your surge suppressor because each one is different and offers a different level of protection. And what about those green, red, and yellow lights on the surge protectors? Since there's no industry standard, these pilot lights might mean one thing on one suppressor and something else on another unit.

Speaking of standards and how the public is sometimes lulled into a false sense of security, I recall a print ad from RadioShack that advertised a power strip on sale for $24.99. The ad talked about those failure-prone MOVs saying, "as good as they are, surge protectors don't last forever. Inside each one are components called MOVs. Each time an MOV does its job and diverts a surge, it also uses up some of its ability to protect. Eventually, all MOVs wear out, leaving your equipment unprotected."

Hmmm, I'll say. Fact is, though, MOVs are not used inside all surge protectors—at least the better ones—and yes, they *are* failure prone. But quality surge suppression doesn't always use MOVs, and, in fact, you're far better off without MOVs in your surge suppressor because it can result in more than damaged electronic equipment, it can be downright dangerous, causing fires.

Better Protection—ZeroSurge's Technology

Better protection is offered by what's known as series-mode designs in surge protection devices. They clamp the surge almost instantly, unlike fuse-designed suppressors, which are slower and failure-prone. One such manufacturer, ZeroSurge of Frenchtown, New Jersey, has a complete line of suppressors using series-mode technology. I visited the ZeroSurge Company and after company president and chief engineer Rudy



Here's something you don't want to see in your home or office. This is what's left after a surge took out this surge protector. It can happen if MOVs go into a "thermal runaway" condition. Best to buy a quality protector!

Here's a look at ZeroSurge's 8R15 Tower. It will be available with patent-pending Spectrum WVR (Wide Voltage Range) technology and can operate over a voltage range of 85 - 265 Volts - truly revolutionary! Cost of the 8R15 Tower is $199.

Harford gave me the grand tour, he demonstrated how his suppressors are different from consumer-grade surge strips—many of which use MOV technology. Connecting a competitor's suppressor to a large 6000-volt, 3000-amp surge generator, Harford turned on the machine and the voltage climbed, as observed on a lighted meter. Then, zap! The volts and amps went *far* beyond a normal surge, a loud crack was heard as the suppressor failed to clamp the spike. Of course this was a worst-case demonstration, but fact is, had this suppressor been connected to my equipment, I'd be a sad camper, indeed.

The bottom line on protecting your equipment from powerline surges/spikes is how much protection makes you feel comfortable. It's a lot like buying insurance; you often don't know what you need until it's too late.

Start with the basics. Are your electrical outlets the three-prong type with proper ground? Because surge protectors work by diverting the excess voltage in a spike to ground, the device is useless if grounding isn't done properly. Beyond *electrical* surge protection, are your antennas and shack equipment properly grounded?

My advice would be not to buy the least expensive surge protector strip or plug-in. Instead, speak with the manufacturer, read the fine print and buy quality. And, if possible, stay away from MOV technology. If you do, know that you should buy a protector with status lights so you'll know when it's time to replace your suppressor. So, what are your surge suppression requirements? With all that expensive equipment, I'll bet you don't want a simple power strip with extra outlets for your equipment. Real protection for your expensive gear is worth it in the long run.

For more information on surge protection devices visit http://www.nema.org, for info on power quality check out http://www.epri-peac.com, and to learn more about lightning see http://www.lightningsafety.com and http://www.lightningstorm.com. ■

Surge Suppressor Manufacturers

Brick Wall: Brick Wall Division, Price Wheeler Corporation, 3800 31st Street, San Diego, CA 92104; Phone: 619-544-8390; E-mail: info@brick-wall.com; WEB: www.brickwall.com.

EFI Electronics: EFI World Headquarters, 1751 South 4800 West, Salt Lake City, UT 84104; Phone: 800-877-1174; E-mail: efi@efinet.com; Web: www.Efinet.com.

MCG Surge Protection: MCG Surge Protection, Inc., 12 Burt Drive, Deer Park, NY 11729; Phone: 800-851-1508; E-mail: sales@mcgsurge.com; Web: www.mcgsurge.com.

Tripp Lite: Tripp Lite World Headquarters, 1111 W. 35th Street, Chicago, IL 60609; Phone: 773-869-1111; E-mail: saleshelp@tripplite.com; Web: www.tripplite.com.

ZeroSurge: ZeroSurge, Inc., 889 State Rt. 12, Frenchtown, NJ 08825; Phone: 908-996-7700; E-mail info@zerosurge.com; Web: www.ZeroSurge.com.

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